v. 10 #2

The MONTHLY REVIEW

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A SOCIETY FOR THE ADVANCEMENT
OF THE
SCIENCE OF ELECTRO-PLATING

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THE ANNUAL BANQUET

OF THE ROCHESTER BRANCH

Will be held at Powers Hotel

Saturday Evening, March 10, 1923

The following committee is making all necessary arrangements: A. S. Groh, Geo. Hesselink, Harry C. Bernard.

These boys say there will be a GOOD DINNER, good entertainment and dancing—all for $2.00 per person.

An invitation is extended to all A. E. S. members and friends to attend. Please let the Secretary of this Branch know you are coming.

MONTHLY REVIEW

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American Electro-Platers' Society

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VOL. X FEBRUARY, 1923 No. 2

EDITORIAL

DO WE NEED GREATER ACCURACY?

The following is taken from The Metal Industry, January, 1923, under the heading of "An Answer to a Plea for Greater Accuracy in Handing Out Plating Information":

"Now, what are the facts? Question 3 of this inquiry read as follows:

"How long should this tinned ware be in solution before it assumes that heavy white clamshell color?

"This shows that the problem in question was not the silver-plating of knives in the ordinary sense, but the silver-plating of knives that had been previously tinned. This necessarily changes the whole aspcet of the problem, since it becomes one of plating silver on tin (or in this case, on a mixture of 90 parts tin and 10 silver applied by the molten dip method on the knives). This was completely overlooked by the writer of the criticism and the letter to the twelve platers.

"Furthrmore, the solution given was not recommended for silver, plating in general. It was given in response to a request for a solution containing two ounces of silver per gallon, and for a very special purpose, namely, that of plating silver on the 90-10 mixture given above. As a matter of fact (as stated in a later letter) it was nothing more than a silver strike solution.

"As regards the efficacy of the advice given by Mr. Proctor to the inquirer, we quote from a letter received shortly afterward:

"'Yours of the 13th inst. at hand, and must say that your plating expert, Mr. Proctor, must have evolved from a plating tank. I know of no other way to so fully express the appreciation of his almost uncanny correctness in answering the million and one questions that aid in the evasive and slippery art of electro deposition of metals upon metals.'

"We believe that no more need be said."

The above would indicate that our recent editorial was entirely unnecessary, especially if we take seriously the letter from one with ability to affirm the correctness of "the **million** and **one**" answers to as many questions that are replied to in the paper mentioned above.

We admit we did not take into account that it was nothing more than a silver strike solution, hence a strike deposit. We regret that we lack ability to read between the lines. We did, however, read about a deposit that **"assumes a heavy clamshell white color,"** that **"shows no tendency to strip** on a **vigorous scratch brush** and **buffing,"** and on which you can "rub all day with a burnisher." All of these terms suggest more than a strike deposit.

In reference to the solution we read, **"A Perfect Working Silver Solution."** And now we are informed that it was nothing more than a silver strike solution. Of course, we should have guessed that a **Perfect Silver Solution** means nothing more than a Silver Strike Solution.

Is greater accuracy needed in handing out plating information? We also believe nothing more need be said. May greater accuracy result from this little discussion.

RESEARCH COMMITTEE'S REPORT

Waterbury, Conn., January 25, 1923.

The Director of Bureau of Standards, Department of Commerce, Washington, D. C.

Dear Sir:

We, the members of the Research Committee, wish to submit the following report of our visit to the Bureau of Standards on January 19th and 20th, 1923:

1st. This is the first time that any definite technical study has been made of any of the processes of electro-deposition.

2nd. In the past and at present, about the only new things offered in the electro-plating field are new formulas for solutions. The formulas are most generally empirical and merely a modification of the existing ones. In the Electro-Chemical Division the study of the principles underlying the function of the chemicals entering into a plating solution has been studied so that, in the case of nickel and acid copper solutions, it is possible to state just why a certain chemical should be added. This is clearly shown in Haring's paper on "Throwing Power." The great majority of platers have associated throwing power with conductivity. Haring has shown that there is a distinct difference between those two properties of a solution. His paper deals with

fundamentals and is the first of its kind to be presented to the electro-chemist and plater. His work will mark a turning point in the study of electro-deposition and the results will be far reaching.

3rd. Hammond's work on the effect of different chemicals on the resistivity of nickel plating solution is to be commended. Several of the contemporary writers on electro-plating will be compelled to change their views, e. g., many advise the addition of magnesium sulphate to a nickel solution as a "conducting" salt. Hammond's experiments clearly prove that it materially adds to the resistivity of the solution and, in fact, has less "conductivity" than any of the chemical salts generally recommended. Thompson's study of the control of the acidity of plating solutions has developed a method by which consistent calculation can be had. Many of the results of experimenters with nickel plating have been proven to be of a neglible value, due to not considering the alkalivity or the acidity of the solution used. His paper on the impurities found in commercial nickel salts has had a very marked effect upon the quality of nickel salts now offered. The publication of his paper was timely and the contents a revelation to platers and manufacturers in general.

Blum and Rawdon in their paper have shown that there is a distinct relation between the crystalline structure of the base metal and that of the deposited metal. During the last year two noted English authorities on electro-deposition have stated in their writings that there was nothing to prove such a relation and that in their work that there was no evidence of any difference in the structure of a deposited metal if it was deposited on a base with small or large crystals. Blum & Rawdon's preliminary experiments warrant further investigation. If what they have found is true of all electro-deposited metals then the work done on the use of "additional agents" will have to be entirely revised as, in no case, has any of the investigators taken the structure of the base metal into consideration.

Scott and Thomas are working on a very important phase of electro-plating, i. e., Nickel Anodes, it is well known that the structure and composition of nickel anodes materially affects the way they dissolve in solutions. Such

work as is being done by the electro-chemical division is to be highly commended. The technical value of this work is considerable, and the commercial application of the principles developed will be far reaching. It is the first time in the history of electro-plating in this country that work of a real scientific nature has been done in a systematic way. The investigators have been guided in their work by persons who have made a real study of the needs of the electro-plating industry.

We realize that this work at the Bureau has just started and that there is much more to do. As members of the Research Committee of the American Electro-Platers' Society, we wish to thank the Director of the Bureau, the Chief Chemist, and the chief of the Electro-Chemical Division, for the opportunity of reviewing their work and offering suggestions for future development. We earnestly desire that this work be carried on and know that what will be done will be of much importance to the manufacturing industries of this country. The taking up of this work is timely. Heretofore the work of men in foreign countries has been held to be of more value than that done in the United States. This condition is changing and with the assistance given by the Bureau of Standards the American plating industry is forging ahead of all others.

The American Electro-Platers' Society heartily commends the work of the Bureau of Standards and offers all the assistance at its command to further the good work started.

Yours truly,

WILLIAM DELAGE,

Chairman Research Committee.

Research Committee—

O. J. SIZELOVE,
PHILIP UHL,
WILLIAM DELAGE.

Electro-Plating Advisor to the Bureau—

GEORGE B. HOGABOOM.

ELECTRO-PLATERS MANUAL

(Continued from November)

By Joseph Haas Jr.

Rules for Speed

To Find Speed of Countershaft in Accordance with Main Shaft and Machine—Subtract the number of revolutions of the main shaft from the number of revolutions the machine should make; divide the remainder by two. The quotient will show the number of revolutions of the countershaft.

EXAMPLE—The main shaft runs 200 revolutions per minute, while the machine should run 1,000 revolutions per minute. Deduct 200 from 1,000, leaving 800, which divided by 2; the quotient will then be 400, which is the number of revolutions the countershaft should make.

To Find Diameter of Pulley on the Main Shaft—Multiply the diameter in inches of the receiving pulley of the countershaft by the number of revolutions the countershaft should make, and divide the product by the number of revolutions the main shaft makes.

EXAMPLE—The countershaft runs 400, the receiving pulley is 7½ inches in diameter, and the main shaft runs 200; 400 times 7½ equals 3,000, which, divided by 200, equals 15; this is the diameter of pulley on main shaft in inches.

To Find Diameter of Pulley on Countershaft Carrying Belt to Machine—Multiply the number of revolutions the machine should make by the diameter of pulley of machine and divide by the number of revolutions the countershaft makes.

EXAMPLE—Say machine should make 1,000 revolutions, the diameter of pulley on machine being 6 inches, and the countershaft making 400 revolutions, then multiplying 1,000 by 6 equals 6,000; dividing this by 400 gives 15, which should be the diameter of pulley carrying belt from countershaft to machine.

To Find Speed of Machine—Multiply the number of revolutions of the main shaft by the diameter of pulley in inches, and divide by the diameter of receiving pulley of the countershaft. The result is speed of countershaft. Then multiply the number of revolutions of countershaft by diameter of transmitting pulley, and divide by diameter of pulley on machine. The result will be speed of machine. It should be well understood that no other pulleys but those in contact with one belt should be considered.

To Find the Horse Power a Belt Will Safely Transmit—Multiply diameter of pulley in inches by its revolutions per minute and the product by width of belt in inches. Divide this product by 3,300 for single belting or 2,100 for double belting, and the quotient will be the horse power that can be safely transmitted.

To Find the Length of the Belt—Add the diameters of the two pulleys, divide by 2 and multiply by 3.1416. To this add twice the distance between centers of pulleys. This is practically correct where pulleys are not very different in size, and are to run with short belt.

A belt velocity of 2,600 per minute is said to give the best results.

All belts should run as nearly horizontal as possible.

Speed of Machine—For polishing, from 2,000 to 2,500 revolutions; for buffing, from 2,800 to 3,000 revolutions.

1 = 0.3183

DIFFERENT STANDARDS FOR WIRE GAGES

Dimensions in Decimal Parts of an Inch

Number of gage	American or Brown & Sharpe	Birmingham or Stubs' Iron Wire	Washburn & Moen Mfg. Co.	Trenton Iron Co.	Stubs' Steel Wire	Imperial Wire Gage	U. S. Standard for Plate
000000	.....	.....	.....	.....	.....	.464	.4687
00000	.....	.....	.....	.480	.....	.432	.4375
0000	.46	.454	.3938	.400	.....	.400	.4062
000	.4096	.425	.3625	.360	.....	.372	.375
00	.3648	.380	.3310	.330	.....	.348	.3437
0	.3248	.340	.3065	.305	.....	.324	.3125
1	.2893	.300	.2830	.285	.227	.300	.2812
2	.2576	.284	.2625	.265	.219	.276	.2656
3	.2294	.259	.2437	.245	.212	.252	.25
4	.2043	.238	.2253	.225	.207	.232	.2343
5	.1819	.220	.2070	.205	.204	.212	.2187
6	.1620	.203	.1920	.190	.201	.192	.2031
7	.1442	.180	.1770	.175	.199	.176	.1875
8	.1284	.165	.1620	.160	.197	.160	.1718
9	.1144	.148	.1483	.145	.194	.144	.1562
10	.1018	.134	.1350	.130	.191	.128	.1406
11	.0907	.120	.1205	.1175	.188	.116	.125
12	.0808	.109	.1055	.105	.185	.104	.1093
13	.0719	.095	.0915	.0925	.182	.092	.0937
14	.0640	.083	.0800	.080	.180	.080	.0781
15	.0570	.072	.0720	.070	.178	.072	.0703
16	.0508	.065	.0625	.061	.175	.064	.0625
17	.0452	.058	.0540	.0525	.172	.056	.0562
18	.0403	.049	.0475	.045	.168	.048	.05
19	.0358	.042	.0410	.040	.164	.040	.0437
20	.0319	.035	.0348	.035	.161	.036	.0375
21	.0284	.032	.0317	.031	.157	.032	.0343
22	.0253	.028	.0286	.028	.155	.028	.0312
23	.0225	.025	.0258	.025	.153	.024	.0281
24	.0201	.022	.0230	.0225	.151	.022	.025
25	.0179	.020	.0204	.020	.148	.020	.0218
26	.0159	.018	.0181	.018	.146	.018	.0187
27	.0141	.016	.0173	.017	.143	.0164	.0171
28	.0126	.014	.0162	.016	.139	.0149	.0156
29	.0112	.013	.0150	.015	.134	.0136	.0140
30	.0100	.012	.0140	.014	.127	.0124	.0125
31	.0089	.010	.0132	.013	.120	.0116	.0109
32	.0079	.009	.0128	.012	.115	.0108	.0101
33	.0070	.008	.0118	.011	.112	.0100	.0093
34	.0063	.007	.0104	.010	.110	.0092	.0085
35	.0056	.005	.0095	.0095	.108	.0084	.0078
36	.005	.004	.0090	.009	.106	.0076	.0070
37	.0044			.0085	.103	.0068	.0066
38	.0039			.008	.101	.0060	.0062
39	.0035			.0075	.099	.0052	
40	.0031			.007	.097	.0048	

LACQUERS AND SOME "ATMOSPHERICS"

By Mr. N. P. Hunter, Member Chicago Branch

Mr. Chairman, gentlemen of the Convention and fellow "Buckeyes," practically every active member of the Society here in convention assembled has, at some time in connection with their art, used lacquer.

It is not a new thing that you are asked to consider. Before Cincinnatus, even before Ramsees, the ancient civilization made and used lacquers and to their knowledge and use thereof may be ascribed much of our present-day knowledge of these peoples through the preservative protection afforded by the lacquer on articles of important historical and scientific value. Some of these articles are practically in their original condition today after the lapse of thousands of years. These older peoples, notably Egypt, India and China, used lacquers largely composed of vegetable gums, somewhat like that made in Japan from the sap of the Rhus Vernicifera or "varnish" tree.

The name "Lacquer" is derived from "Lac," a resinous substance secreted by a scale insect, Carteria Lucca, which feeds upon the twigs and branches of certain trees, especially certain species of the genus Ficus, or "lac" tree. In the breeding season the female of this insect affixes her body to a branch or twig of this tree on which she has been feeding by a covering or cell formed from a body secretion composed largely of this lac-tree sap upon which it has subsisted, lays her eggs and dies. The young insects pierce the casing or shell, spread upon the adjoining branches to feed and complete their natural cycle. This insect multiplies rapidly and, not being able to fly, frequently so infests and covers the branches and withdraws the sap so completely that the branches wither and dry up. In the habitat of this tree and insect, Northern India and Siam, the natives gather the dried branches covered with these scale cells and carry them to factories, sometimes many miles distant. There by grinding, etc., this Stic-lac, as it is called, is converted to Seed-lac. After washing and grading, the Seedlac is placed in heavy canvas bags and heated over an open fire; as the gum melts and exudes through the canvas it is scraped off, spread upon a flat surface and, when cool enough to handle, is skilfully pulled into thin sheets, which,

after hardening, are broken into the flaky pieces constituting what is commercially known as "shellac."

Modern air drying lacquers are made from nitro-cotton dissolved in solvents to which is added certain gums. Other lacquers are made from gums which have scientifically processed to adapt them for this purpose. The shellac mentioned, in various grades and after special processing, is one of the gums used in some lacquer composition.

The one thought inspiring that which follows is to bring to your attention and understanding one fact, which is **"that you, as electro-platers and finishers of metals, owe as much thought and care to the PRESERVATION of your metal finishes as you give to their PRODUCTION.** That fine slogan of the paint and varnish trades, "Save the surface and you save all," in apt phrase, covers one of the most important reasons for your existence as a branch of metal manufacturing. You mechanically or chemically finish a metal article or you electrically deposit a metal upon another or like metal, and mechanically or chemically complete its finish, thereby increasing the value, usability and saleability of the article, **provided** the finish you have created is permanent or can be rendered permanent in a greater or less degree. This material, speaking of lacquer in its modern form, is one aid that is practically indispensible to you for this purpose. Few, if any, of our members realize to what an extent industry in general and the metal industries especially, are indebted to the sturdy part lacquer has played and does play in their continuance and advancement. So vital is its functioning in your profession that, without its durable protective film, most of the electro deposits and colorings on and of base metals and many on and of precious metals would be of so impermanent and evanescent character as to be worthless either artistically or commercially.

With proper processes, using high quality raw material, quick air-drying lacquer solutions are made which dry evenly and smoothly and furnish a durable, yet flexible, waterproof film that will protect all surfaces to which it is properly applied. These are the **speed** lacquers made to keep pace with the rush of modern manufacturing methods. Ready to surge forth from the spray nozzle under the con-

trol of the skilled operator, with air pressure ranging up to one hundred pounds conveying the lacquer in minute globules to the surfaces you have skillfully or artistically prepared; each tiny globule combining with its neighbors to form a homogeneous film for its protection. Several methods of application enables your work to proceed without undue delay to its next manufacturing step, and will provide you with a satisfied assuredness that the time and labor and skill that you have previously expended on these surfaces will be so permanently retained that it will reach and give use and enjoyment to the ultimate user and remain in such condition for a greater or less period as its nature or use warrants.

After all has been said, other features being fairly equal, finish is the determining sale factor. Finishes are what you are paid to produce. If your finish is of high quality, protect it accordingly. If of a lower grade, bring it up, enhance it, with this protecting film.

As a body this society is primarily interested in the lacquer for use upon metal finishes it will be mentioned only that various grades are made for use on other surfaces, such as wood, glass, cloth, leather, fibre, paper, etc.

The protective action of lacquer upon metal surfaces is obtained by superimposing a durable film of a nature highly resistant to the action of air, moisture and various gases. This film may be transparent, semi-transparent or opaque. It should be adhesive, durable and hard. Three methods of application are in general use: brushing, dipping and spraying. For each of these several methods of application the lacquer should be adapted. For instance, the quality of solvent in the brush lacquer that permits of proper distribution under the brush before the film sets up, in a dip lacquer the smooth, even distribution of the film and absorption of the drip by capillarity; the composition of a spray lacquer that it will properly flow to a homogeneous film and set up without wave when applied at predetermined air pressure. There are lacquers especially adapted for use with colors and lacquers intended to have opaque surfaces, such as glossy and dead black lacquers, lacquer enamels and bronzing liquids, intended for use with bronze powders.

In considering the use of lacquer it must be understood that, with the large number of differing metals and finishes used commercially, and the varying texture of the surfaces, it has not been found possible to produce any single lacquer composition that would have all the desirable requirements for all metals and finishes, so it has become a trade necessity to compose lacquers intended for specific metals and finishes as well as for different methods of application so that the essential artistry of the metal or finish may be maintained.

For your part take into consideration the **color** of the metal for clarity of film required; the **texture** of the finish, whether highly polished, burnished, brushed or matte for the quality of lustre desired in your selection of lacquer; and in connection with the last, the **density** of the metal that you may secure requisite adhesiveness. Color buffed silver and nickel are much alike as to the clarity of the lacquer film required, but the nickel, being the denser metal, affords a poorer anchorage or "tooth" for the lacquer so that it might well occur that a perfect lacquer for the silver would not adhere well to the nickel.

It is also very essential that you properly prepare articles previous to lacquering. This preparation may be amply covered by one word, "cleanliness." By this is meant **plater's** cleanliness. None of your would think of plating upon a metal surface covered with a grease applied hot and expect to obtain an adherent metallic film, yet many apply lacquer over a buffed or spotted surface, that has, perhaps, been dry-wiped, thus distributing the grease a bit more evenly, and expect to obtain good adherence. No one knows better than you that dirt, grease and stain, or the embryo of staining, is not always visible upon metal surfaces, but you do know absolutely from the previous processing of these surfaces whether any, possibly all, of these things are present. Eliminate them for no lacquer can perform its real duty of protection upon such a surface. In brush lacquering the lacquer solvents, from their nature, loosen up some of the dirt and grease that may be upon the surface of the metal to which it is applied, but to the extent that this occurs, such grease and dirt is largely incorporated in the lacquer film; is spread over the surface

and imparts a discoloring shade to the lacquer film in spots or streaks. In dip lacquering under similar conditions of surface, peeling may occur, does occur unless the lacquer has been especially adapted to meet this condition. Even in the latter event enough of extraneous matter is carried into the lacquer bath in a short time to permanently impregnate and discolor its content to such an extent that it is thereafter impossible to obtain a lacquer film that will not modify the color of most metal surfaces. In spray lacquering, as there is practically no movement of the lacquer over the surface of the metal, there is much less cleansing action by the lacquer solvents than is secured either in the brushing or dipping process, consequently even a poorer adhesion is obtained. Where it is not feasible to use chemically prepared water baths for cleaning, lacquer thinner, or other cleaning solvents that will not stain the metal, may be successfully used. Upon "wet" finishes a precipitating thinner may be used for removing water from surfaces that do not readily admit of sawdust or other drying.

This same cleanliness should be observed in all that has to do with lacquering; tanks, cups, brushes, syraying apparatus, the lacquer room and its contents. Dust-proof your lacquer room; oil the floors. Dust is responsible for much of the roughness and lack of clarity in the lacquer film

Another important feature that you should attend to is the quality of the air used in the lacquer room and for compressing purposes. Its relative freedom from moisture and other vapors. It is known that an excess of moisture in the compressed air supply will cause a staining of the lacquer film. The same is true of vaporized oil carried into the air supply from the compression chamber of the air compressor.

Lacquering difficulties due to moisture in excess are most prevalent in the hot, humid periods; the reason for this is the amount of water free air will sustain in the form of vapor increases as the temperature increases; thus one cubic foot of free air at sea level with a relative humidity of 100%, or dew point,

at 32 deg. F. will contain 2.11 grains of water vapor,

at 51 deg. F. will contain 4.22 grains of water vapor,
at 70 deg. F. will contain 7.98 grains of water vapor,
at 90 deg. F. will contain 14.79 grains of water vapor.

Let me instance how this may affect the compressed air supply: An ordinary air resevoir of thirty gallons' capacity (about four cubic feet) will contain at forty pounds guage pressure approximately fifteen (14.92) cu. ft. of free air. The average relative humidity, in this country, at sea level, is 50%. At this average relative humidity the water vapor content of 15 cu. ft. of free air at 51 deg. F. is 31.7 gr., at 70 deg. F. is 59.9 gr., at 90 deg. F. is 105.9 gr. It will be comprehended that this amount of air after compression as stated will not sustain, at the same relative temperature, the amount of water vapor content had before compression. In practice the temperature of the compressed air supply at the lacquer bench will be at about room temperature in the summer or hot months, and will rarely fall below 70 deg. F. Taking this as the lowest using temperature of the compressed air during this period it is found that it will sustain in the form of water vapor all moisture contained in the air entering the compressor at a temperature up to 52 deg. F. with a relative humidity of 50%. With a higher temperature and the same, or higher, relative humidity, or, the same temperature and higher relative humidity, there will be condensation of water in the compressed air supply, which, uneless removed, is carried to and mixed with the lacquer spray. While this excess water, and excess oil, condensed from vapor from excess lubrication, can be removed by inserting a condenser or separator, or both, in the compression system, the better practice appears to be to prevent as much moisture entering the compression chamber as possible, and to remove what does enter before reaching the service pipe line.

Westinghouse states "Cool, dry air is essential to the economical operation of an air compressor. The air inlet should be piped to a point where such air can be obtained. The air inlet should have an area of at least 50% of the air piston area and should be of nonheat-conducting material. A strainer should cover the inlet to prevent admission of dirt and foreign matter. The air leaving the compression chamber should be cooled so that it will be at its lowest

temperature at the time of entering the air reservoir." This cooling ordinarily is done by radiation or water cooling. "That the amount of cooling of the air should be such before it **enters** the air reservoir that all precipitation of moisture will be complete before the air **leaves** the reservoir."

Condensing devices usually take advantage of the affinity of the moisture for surfaces. The cooler the surface is, relatively, the more freely the air coming in contact with it condenses. This holds true of the lacquered metal surface during the dripping or setting up period. Evaporation of the solvent in the lacquer film, however applied, begin at once and a cooling of the lacquered surface takes place. With the relative humidity at or near dew point a very slight cooling will cause some condensation of water on the wet lacquered surface. At this stage of the lacquer process any water on any lacquer is detrimental.

The ideal method, or practice, which will provide against any moisture at any time sufficient to interfere with any process of lacquering would be to hermetically close the lacquer room and admit only such air as had been dehydrated to such a relative humidity, that, when raised to the lacquer room temperature, would retain, under any lacquer room condition, all of its moisture content in the form of vapor. With the air inlet for the compressor drawing its supply from the same source; with proper suction for removal of the lacquer fumes and fresh, dry air to facilitate your every operation under unvarying conditions the year round, you would receive the maximum of protection and finish from any lacquer which your material or the exigency of competition may make advisable or necessary to use.

Statement—From the offices of Supreme President the accounts of our former Supreme Secretary-Treasurer, Mr. J. E. Sterling, have been all closed and found correct and the formal report of the Committee on Audits will be presented to the annual meeting at Providence, R. I., with their recommendations.

(Signed) F. J. HANLON,
Supreme Secretary-Treasurer, A. E. S.

RUST PROOF ON IRON

By William J. Bell, Philadelphia Branch

The samples of cast iron plate and sheet iron cage shown here were placed out on roof of building, where they had been treated, from May 13, 1921, until today, April 7, 1922.

Eleven months exposed to all kinds of weather and at times half covered with snow. And as you see no trace of rust on the samples. I think we have found a rust-proof coating.

The solution should be prepared as follows:

An iron tank fitted with steam coil to heat solution to boiling point. A cover should be arranged over tank made of sheet iron to keep combination confined to tank as much as possible.

Formula

Water	1 gal.
No. 1 phosphoric acid	4 oz.
Black oxide manganese	1 oz.
Finely powdered gray iron	1 oz.

The solution prepared as above should be boiled for a short time, replacing the water lost by evaporation.

The up-keep of the solution is maintained by the addition of small proportions of phosphoric acid and black oxide of manganese as required to keep up a substantial finish. Also the water must be replaced as evaporated.

Clean work in the regular way for plating and keep work in tank from 1 to 2 hours. Keep solution near boiling point while work is in tank.

The addition of a small amount of metallic zinc to the solution makes it more effective.

THE FIRST METAL FINISHERS' EXPOSITION

Dayton Branch will hold an event of far-reaching importance and value to the metal finishing industry, electro-platers and A. E. S. on April 9-14 inclusive.

As hinted in the January issue of the REVIEW the Metal Finishers' Exposition is the project proposed by Mr. M. G. Kopf and approved by the members. It gives us pleasure to report that the details have been completed and in less than ten days sixty per cent. of the space in Memorial Bldg. was disposed of to such concerns as American Rolling Mill Co., National Cash Register Co., Computing Scales Co., Egyptian Lacquer Mfg. Co., Waukegan Chemical Co., Dayton Air Brush Co., Hill & Griffith

Co., The Thomas Buchanan Co., J. B. Ford Co., Magnus Chemical Co., Udylite Process Co., Dayton Plating & Mfg. Co., Hohman Plating Co., Kay & Ess Paint Co., American Display Co., American Cities Service Corp. This, we believe, indicates better than words can describe the response and co-operation with which the idea has been met.

The purpose of the Exposition may be described as:

1st. To acquaint the buying public with the various methods, materials and equipment, and the many phases of the metal finishing business necessary to produce the decorative and protective finishes which they consider so essential on all products.

2nd. To acquaint the manufacturer and dealer of these products with the many materials, processes and equipment we find necessary to produce these finishes, and likewise to demonstrate their application and use.

3rd. To gain through the above a better understanding and recognition on the part of the manufacturer, dealer and public of the importance of the metal finisher in general and electro-plater in particular.

This is the first opportunity ever presented the electro-plater and the metal finisher to bring before the public, through the working exhibits of the manufacturers of the equipment and materials he daily uses, the tremendous importance of his part in our industries. It will show likewise to the manufacturer of finished products, who employ metal finishers, what a vast amount of material and equipment and expert knowledge is in back of the metal finishers' position. We well know, as does the advertising and sales departments, and as every merchant will testify, that the first impression of every product is its finish. Our Exposition will show the "Front Office" as well as the dealers and buying public just what is involved in making an article saleable and durable. Finishes have been shown at other exhibitions and shows, but not specifically so, rather as an after thought in connection with automobiles, etc. Our exposition will have no distractions and will be built up on the finish first and the products second, showing through the working demonstrations important steps in the manufacture and application of finish materials and equipment necessary thereto.

The Dayton Branch will provide in a conspicuous position a fully equipped plating room in operation. Souvenirs will be given various finishes in the presence of the public and distributed. There will be a lecture in popular language each afternoon and evening on various finishing subjects. A day each will be set aside for ladies, school children and local and visiting civil organizations. On these days special programs will be given. On Saturday we will have a banquet for visiting A. E. S. members and exhibitors. We hereby invite all our brother associates. You and they will be given a cordial reception. Please have your secretary notify the director, M. G. Kopf, 612 Schwind Bldg., Dayton, Ohio, so that arrangements can be made to meet you and entertain you. Spend a few days with us. Arrangements will be made to visit local plants as part of the educational program. Your friends and employers bearing

notice from you or information in advance will be regarded as a fellow member while visiting us.

This is the biggest proposition ever attempted under the auspices of the A. E. S. and deserves the support of each and every mmber, if not by your presence, at least by advertising the Exposition wherever possible. It will not be necessary to emphasize the value to the individual electroplater and the A. E. S. of this Exposition in extending to the public an opportunity of learning in an interesting way of the importance of the metal finisher in the industrial world. Let us all get together to make it a success. The idea will no doubt be carried out in other cities based upon our experience here. If any member would like to make an exhibit of his work, particularly of an unusual nature, we would be glad to place it in the A. E. S. booth with the name and address of owner. We would like to have an appreciable number of specimens of the platers' art. Address all exhibits and communications to address above.

WHAT THE BRANCHES ARE DOING

Cincinnati Branch

The last meeting, January 19, held at the Y. M. C. A. Building, was well attended, numbering about 22 members. After the regular business the evening was given over to making the road clear for the coming of Mr. M. G. Koff to give us an illustrated lecture on "Corrosions of Metal." We will welcome him here and make his stay one that will please him in just the way he will like it best and greet him with a large audience to show how much our Cincinnati industries appreciate just such talks that our friend Koff can give. Will give you full details of Mr. Koff's lecture after February 10, which is the date set, at Cincinnati, at the Chemical Labratory Building at the Cincinnati University.

Boston Branch

Boston Branch met Friday, the 19th, at the American House, with President Nihan in the chair. We had a large meeting and after the regular order of business the question of holding an open meeting was taken up. After much discussion it was decided to hold the next two meetings of the branch as open meetings.

A committee of two were appointed to send letters around to all firms that employ a plater to see if they could get him to come to the meeting. By this way it is hoped that we may get a few new members, and also to get the firms interested in the society.

We hope to have a member from another branch to be a speaker, and Mr. Mackie of Boston Branch will give a talk.

The question was asked, What is the cause of the itch that platers get at times? Different answers were given: (1) That the nickel solution was the cause; (2) that the fumes from the chlorine acid was another; (3) that it was the condition of the man's blood; if poor he would get it and if good, why he would never have it.

One of the members told of the trouble he had when he used sodaium cyanide in his gold solution; little brown spots would show up on the

work, and that when he used potassium cyanide he had no trouble at all. We would like to hear from some of the other branches on this question. Discussions on the above question lasted over an hour, when the meeting adjourned at 10:15 P. M.

Connecticut Valley Branch

Connecticut Valley Branch held its first meeting in the new hall at 747 Main street, Hartford, on Monday, January 22. Vice-President Vibberts presided and there were eight members present. Mr. Paul L. Sampsell of Essex, Conn., was elctd to active mmbership.

A committee of three, consisting of Messrs. H. R. MacFadyen, E. M. Stephenson and James A. Bagshaw, was appointed to co-operate with the Waterbury and Bridgeport Branches in planning a joint banquet to be held during March or April.

The speaker at this meeting was Mr. W. A. Grane, his subject being "Cleaners and Cleaning Methods." A number of cleaning problems were discussed by Mr. Grane, whos etalk was very much appreciated.

The members were much pleased with the new meeting place. It is large enough to accommodate all the platers in the State and its location in the center of the city makes it very convenient for out-of-own members.

Newark Branch

The regular meeting of Newark Branch, A. E. S., was held on Friday evening, February 2, with 11 members present, President O. J. Sizelove occupying the chair. Banquet Committee reports progress. Our President gave us a report of his visit to the U. S. Bureau of Standards at Washington, D. C., attending the Research Committee meeting, which was exceedingly interesting.

Our Librarian, Mr. Edw. W. T. Fainth, was with us again after an absence of two meetings, due to illness, and gave us pointers on the prevention of "spotting out" upon brass-plated iron. Discussion upon the manipulation of the copper-ammonia black dip upon brass was indulged in. Meeting adjourned at 10:30 P. M.

Detroit Branch

Regular meeting Detroit Branch, held Friday, February 2, Old Colony Club, Hotel Tullar, Vice-President B. F. Miller presiding in absence of O. H. Phelps. Minutes of previous meeting read and approved. Communications from F. J. Hanlon, Andrew V. Re, Roy L. Shepard, Clarence D. Spahr, and Chicago, New York Branches regarding their respective banquets, New York requesting a paper from one of our members, and T. C. Eichstaedt unanimously selected and consented to contribute.

Good of Order—H. S. Brockway submitted samples of bright nickel plating upon die castings, bronze, brass, steel, copper plated and buffed, and steel, finished 120 oil, all above plated 25 minutes after racking; also two aluminum die castings, plated 1 hour and 20 minutes, one buffed and the other not buffed after plating, with no apparent difference. He further states that as soon as experiments are completed and complete, data

compiled, he will send it to MONTHLY REVIEW for publication. There is much to commend in this latter statement. Samples were wonderful. Mr. E. T. Hartz also submitted samples of plumbing supplies that left nothing to be desired for cheap, reliable production methods. Mr. L. J. Moore told of getting splendid results in nickel plating of sheet zinc, in single salt solution, with addition of ¼ oz. wood alcohol to gallon. Although his work covered only the plating of 1,200 pieces, he sees no reason why it should not be successful indefinitely.

Mr. E. A. Murphy is conducting experiments with automatic throwing in and out of rheostat switches, according to amount of amperes necessary. Verily, Detroit do move.

Remember, the Secretary gave fair warning that this branch would set a mark for all of them to shoot at, and miss.

In bronz spraying, or lacquering, of copper-plated articles with high lights relieved, Mr. Andrew V. Re strikes his work in a bright brass solution after copper plating. When high lights are buffed the back remains yellow and requires very little lacquer or bronze.

The meeting was largely attended and general discussions held to a late hour and was adjourned with reluctance by all present.

Mr. Roy L. Shepard states that his firm is desirous of securing the services of an analylitical and electro chemist. He desires anyone qualified to get in touch with him at the Shepard Art Metal Company, Detroit, Michigan.

Cincinnati Branch

On February 4 our last meeting of Cincinnati Branch met at the Y. M. C. A. Building with a very good attendance. The business was gone over, then the evening was given over to the welfare of welcoming of Gr. G. Koff on the 10th of February, who will be with us at University of Cincinnati, and give a talk, with microscopic slides, or corosion of metal, to conclude with a two-reel movy film on the making of rust-proof steel. As we wish to greet Mr. Koff with a large audience for his trials and troubles of coming down to Cincinnati and accord him a worthy welcome of greeting and appreciation of an unlimited membership who enjoy his worthy talks.

Philadelphia Branch

The regular monthly meeting of Philadelphia Branch was held February 2, President George Gehling presiding, and was well attended and made an interesting meeting. After the routine of business had been dispensed with a general discussion was held on various subjcts. Mr. Uhl gave an interesting review of his recent trip to Washington with the Research Committee and told of the work being accomplished by the Bureau of Standards.

Lacquer will be the topic at the March meeting.

Chicago Branch

Chicago Branch held its regular meeting with President Bott presiding anl all officers present and good attendance in spite of the inclement

weather. We had a visitor in the personage of A. Shepperd of Detroit Branch, who joined in the spirit of the meeting.

The announcement of New York feast was received and read. We received one application, Mr. Zeno Benefer of Frank Holton Co., Elkhorn, Wis., as an active membership, and referred to a committee for investigation.

Mr. Servis finished reading his paper on "Corrosion" and received a vote of thanks from the branch, and this will be sent to the REVIEW in near future for publishing.

The Librarian had following questions in box:

Question 1—If colloids do not disassociate or tonize, what happens to them?

Answer 1—It was thought they acted as a diaphram in solution causing a finer deposit and remained inert in solution when not functioning. It was also thought that colloides acted as cathalitic agents in plating solution and to fully determine what they did do would require nature of agent and solution being known.

Question 2—What is best way to oxidize bronze (phospher) without coppering first the bronze springs must be black?

Answer 2—It was suggested to use hyposulphide of soda and sugar lead as a hot dip.

Question 3—Has anyone a formula for plating platinum; or can platinum be plated?

Answer 3—It was suggested to use Rosselers formula of phos. sod. phos, amon, chloride platinum hot.

Question 4—What is cause of blotchy surface forming on silver deposits after the current is shut off?

Answer 4—It was thought that there was not enough free cyanide in solution.

Dayton Branch

The largest attendance yet on record was had at the regular meeting of the Dayton Branch on Saturday, February 3. Report of the Exposition Committee and the subject of the evenings talk contributed to the big attendance.

Mr. Forest Hartzell, member of the Dayton Branch, gave a most instructive and interesting talk on "Cadmium Plating." Considering the discussion on the subject in the pages of the REVIEW the members were eager for information based on Mr. Hartzell's practical experience in the use and application of cadmium for rust-proofing during the past year. Many new and interesting features were discussed by the speaker and illustrated by specimens. The discussion following the talk was very lively and all agreed that a better opinion of the appliction of cadmium resulted and prejudices destroyed.

Among the many interesting facts brought out by Mr. Hartzell was the ease with which aluminum can be cadmium plated and over which a wide application of cadmium on aluminum as an anti-rust priming coat for bake-enamels.

The Exposition Committee made a most impressive report which was

enthusiastically received. Announcement appears elsewhere covering details of another one of Dayton's new ideas.

Bridgeport Branch

The report of our two meetings—January 19, open, and February 2, regular—were opened as usual by the president, Mr. J. W. Slattery, with both meetings largely attended. We had Mr. Charles Proctor as speaker at our open meeting, who gave a very pleasing and intersting talk on plating—its past and future. After his address and then answering many questions a luncheon was served, which was greatly enjoyed by all, to say the least.

St. Louis Branch

Our meeting on January 2, while not having a large attendance, was as interesting as it could possibly be. The important business was that preliminary to a banquet, and our educational feature was a paper on "Resistances" by our president, F. Horath. Owing to lateness of the hour, discussion on this paper was laid over.

Our tenth anniversary, held on January 13, was a big success. The afternoon session was attended by 60 men, which we consider great for first attempt. A paper on "Resistance of Nickel Solutions," with charts, prepared by E. W. Heil, was read and explained. It proved very interesting to all present, many of whom had never had the opportunity to know of the work being done by many members of the A. E. S.

Mr. Guy White, assistant superintendent of the National Stamping and Enameling Company, then read a paper on the "Physical and Chemical Properties of Steel." Mr. White also explained the causes of some of the defects in steel and exhibited samples. Those present appreciated the privilege of talking to a man of the ability Mr. White possesses.

Mr. E. S. Weil of St. Louis Branch read a paper on the "Electromotive Theory," which was also very interesting.

The Bureau of Standards, upon request, furnished us with copies of two papers they prepared and which have been printed in the MONTHLY REVIEW. These extra copies went into hands of non-mmbers.

Mr. G. S. Robins, who presided during this session, explained these papers and told of work which Dr. Blum and his co-workers were trying to do at the Bureau.

While this session was in progress, Mrs. E. J. Musick took the ladies to the movies.

It was 7 P. M. when we sang "America," and then partook of an excellent menu, during which we were entertained by two (Lemons).

Mr. and Mrs. Lemen have an excellent reputation as entertainers and were at their best.

"Ten Years of St. Louis Branch" was subject for a few remarks by H. H. Williams.

"Greetings From Supreme Society" was a real heart-to-heart message from and by our supreme secretary, F. J. Hanlon, of Chicago.

Then, not to be too serious, we put on our humorist, Hedley J. Rich-

ards, who recited poetry; sure it was comic, real good, original, jolly stuff.

Mr. C. H. Proctor, not being able to be present, sent in a paper on "Faith."

Mr. G. S. Robins also demonstrated that he had not got past "college days" and gave several real good readings. Mr. F. C. Rushton received a hearty welcome and made a few remarks.

Greetings and regrets at not being able to attend were received from Supreme President Walter J. Allen, Supreme First Vice-President B. D. Aufderheide, J. S. Sterling; also from Chicago and New York Branches.

Dancing began at 9 P. M., with music by "Deck's Dixie Orchestra," and (E. J.) Musick as floor director. Everybody had a good time.

It was a big event for St. Louis Branch, as over 150 were present at banquet. It will bring in several applications for membership. Visitors were present from Chicago, Indianapolis, Decatur, Evansville and Belleville.

The new slogan of St. Louis Branch: "If you want it done right, let Ed (Musick) do it."

Our next regular meeting is on February 6.

APPLICATIONS FOR MEMBERSHIP

Providence-Attleboro Branch

Mr. Games Goarde, active.....437 Central Ave., Pawtucket, R. I.

Cleveland Branch

Mr. Silas B. Plummer.....5612 Northcliff Ave., Cleveland, O.
Mr. Earl Pettijohn.....1384 Grant St., Akron, O.

Detroit Branch

Eugene Allston Murphy, associate, electro chemist.
Harold K. Woodmansee, chemist-plater.

Philadelphia Branch

Louis A. Edelman, associate.....1820 Wellington St., Philadelphia, Pa.

Chicago Branch

Zeno Benfer .....Elkhorn, Wis.

New York Branch

Active, Joseph L. Downes.....403 Clermont Ave., Brooklyn, N. Y.
Associate, Wm. Laughlin.....35 Broadway, Brooklyn, N. Y.

Bridgeport Branch

Robert E. Mooney .....613 Elm St., New Haven, Conn.

APPLICATION WITHDRAWN

Philadelphia Branch

Louis H. Dworkin .....2517 N. 31st Philadelphia, Pa.

ELECTED TO MEMBERSHIP

Providence-Attleboro Branch

James William Tyrell, active.....199 Belvue Ave., Providence, R. I.

Hartford Branch

Paul L. Sampsell, active.....c|o Tilley Pratt Co., Essex, Conn.

Cincinnati Branch

Anthony J. McGuire, active.....2331 Duncan St., Louisville, Ky.

SUSPENDED

Philadelphia Branch

Charles R. Mehl .....2201 N. 4th St., Philadelphia, Pa.

BOSTON

Regular meetings are held third Friday of each month, at 8 p. m., at the American House, Boston. Secretary, A. W. Garrett, 821 Dorchester Ave., Dorchester, Mass.

BRIDGEPORT

Meets third Friday of each month in its laboratory, 260 John St., Bridgeport, Conn. Secretary, David Fleming, 97 Roosevelt St., Bridgeport, Conn.

CHICAGO

Meets second Saturday of each month, at 8 p. m., at the Hardware Club of Chicago, Room 1125. Secretary, F. J. Hanlon, 216 N. Jefferson St., Chicago, Ill.

CINCINNATI

Meets on the first and third Friday in each month, Y. M. C. A. Building. Secretary, W. J. Husing, 729 McMakin Ave., Cincinnati, Ohio.

CLEVELAND

Meets last Saturday of each month at Hotel Winton. Secretary, B. F. McCormick, 2024 Wyandotte Ave., Lakewood, O.

HARTFORD

Meets on the fourth Monday of each month at 747 Main St., Hartford, Conn. Secretary, Tennant Elwin, Newington, Conn.

DAYTON

Meets first Saturday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, C. Van Derau, 61 Bish Ave., Dayton, Ohio.

DETROIT

Meets first Friday of each month at the Old Colony Club, 2nd floor, Hotel Tuller. Secretary, E. W. Woodmensee, 1427 Lee Place, Detroit, Mich.

GRAND RAPIDS

Meets on the second Wednesday of each month at the Vocational High School, 129 Bostwick Ave., N.E. Secretary, Chas. S. Whalley, 931 Pine Ave., N.W., Grand Rapids, Mich.

INDIANAPOLIS

Meets the second Saturday of each month at Hotel Denison. Secretary, Louis Mertz, 1725 Union St., Indianapolis, Ind.

MILWAUKEE

Meets second and fourth Thursdays of each month at the West Side Bank Bldg. Secretary, R. Steuernagel, 1508 Concordia Ave., Milwaukee, Wis.

MONTREAL

Secretary, A. Geroux, 48 Craig West, Montreal, Quebec, Canada.

NEWARK

Meets first and third Fridays of each month at No. 17 Central Ave., Newark, N. J. at 8 p. m. Secretary, Royal F. Clark, 71 Chadwick Ave., Newark, N. J.

NEW YORK

Meets second and fourth Fridays of each month at the Broadway Central Hotel Parlors, New York City. Secretary, John E. Sterling, 468 Grand Ave., Long Island City, N. Y.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Pennsylvania, 34th and Spruce Sts. Secretary, P. Uhl, 2432 North 29th St., Philadelphia, Pa.

PITTSBURGH

Meets first Saturday of each month at 8 p. m., at United States Bureau of Mines Bldg., Forbes St. Secretary, S. E. Hedden, 227 Fifth St., Aspinwall, Pa.

PROVIDENCE-ATTLEBORO

Meets first and third Thursday of each month at 26 Custom House St., Room 16. Secretary, C. J. Poyton, 269 Ohio Ave., Providence, R. I.

READING

Meets on the second Tuesday of each month. Secretary, William M. Fisher, 654 Gordon St., Reading Pa.

ROCHESTER

Meets every second and fourth Saturday of each month at the Hotel Seneca. Albert H. Doering, Secretary, 49 Cutler St., Rochester, N. Y.

SYRACUSE

Secretary, M. J. Crean, 109 Court St., Syracuse, N. Y.

ST. LOUIS

Meets first Tuesday of each month at Barr Branch Library, corner Jefferson and Lafayette Sts. Secretary, H. H. Williams, 4156 Botanical Ave., St. Louis, Mo.

TOLEDA

Meets first Thursday of each month at Toledo University Science Building, Electro-Platers' Room, corner Cherry and Page Sts. Secretary, H. L. Myers, 410 Palmer, Toledo, Ohio.

TORONTO

Meets fourth Monday of each month at Canadian Foresters' Hall, 22 College St., Room No. 2. Secretary, E. S. Turner, 873 St. Clair Ave., Toronto, Ontario, Canada.

WATERBURY

Meets every second and fourth Friday of each month. Secretary, Wm. Delage, 47 Prospect St., Waterbury, Conn.